

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
3 June 2004 (03.06.2004)

PCT

(10) International Publication Number
WO 2004/047297 A1

(51) International Patent Classification⁷: **H03K 19/0185**

(21) International Application Number:
PCT/IB2003/005177

(22) International Filing Date:
15 November 2003 (15.11.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/427,422 18 November 2002 (18.11.2002) US
60/499,197 27 August 2003 (27.08.2003) US

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL];
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DE LANGEN, Klaas-Jan** [NL/US]; 1109 McKay Drive, M/S-41SJ, San Jose, CA 95131 (US). **SINGH, Balwinder** [US/US]; 1109 McKay Drive, M/S-41SJ, San Jose, CA 95131 (US). **TOY, Edmond** [US/US]; 1109 McKay Drive, M/S-41SJ, San Jose, CA 95131 (US).

(74) Common Representative: **KONINKLIJKE PHILIPS ELECTRONICS N.V.**; c/o **LESTER, Shannon**, 1109 McKay Drive, M/S-41SJ, San Jose, CA 95131 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

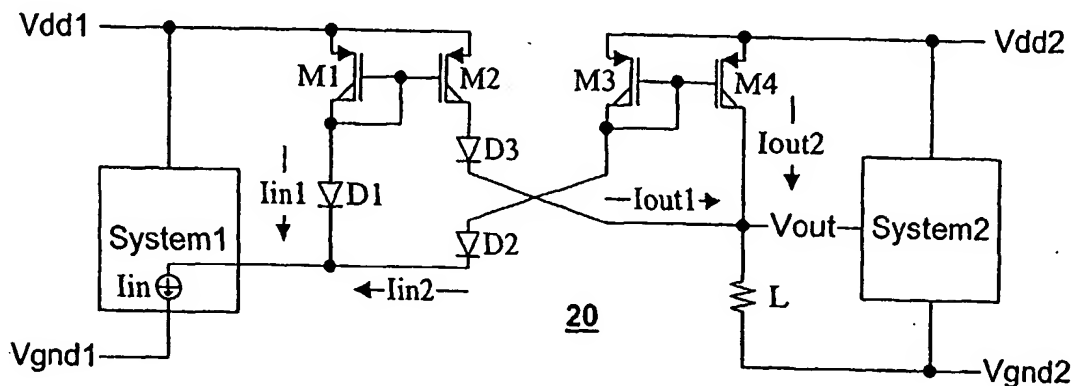
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE,

[Continued on next page]

(54) Title: LEVEL SHIFTING CIRCUIT BETWEEN ISOLATED SYSTEMS



(57) Abstract: A level shifting circuit (20, 30) couples an input current (I_{in}) from one system to another, isolated, system, by driving a single load (L) via one or more current mirrors of a common type. In a first embodiment (20), two similar type (either N-type or P-type) current mirrors ($M1, M2; M3, M4$) provide output current (I_{out1}, I_{out2}) to a common load. Diodes ($D1, D2$) are used to split the input current (I_{in1}, I_{in2}) between the two current mirrors during normal, non-faulty conditions, and to turn off either one of the two current mirrors during a fault condition to permit proper operation in the presence of a fault. In a second embodiment (30), a single current mirror ($M1, M2$) mirrors the input current (I_{in}) to the output load (L), and a pair of diodes ($D1, D2$) selects which of the isolated systems to use as the power source in the event of a fault.

INTERNATIONAL SEARCH REPORT

Rec'd PCT/PTO-18 MAY 2005

International Application No.
PCT 03/05177A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H03K19/0185

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H03K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 452 418 B1 (DE LANGEN KLAAS-JAN ET AL) 17 September 2002 (2002-09-17) cited in the application column 2, line 40 - column 3, line 44; example 3	1, 8, 19, 20
A	US 6 154 061 A (BOOMKAMP ALOYSIUS J M ET AL) 28 November 2000 (2000-11-28) cited in the application the whole document	1, 8, 19, 20
A	US 5 030 855 A (LEUNG WINGYU) 9 July 1991 (1991-07-09) the whole document	1, 8, 19, 20

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

26 February 2004

Date of mailing of the international search report

04/03/2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Feuer, F

INTERNATIONAL SEARCH REPORT

Information on patent family members

International

Application No

P 03/05177

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
US 6452418	B1	17-09-2002	WO	03003576 A2		09-01-2003
US 6154061	A	28-11-2000	EP	0996999 A2		03-05-2000
			WO	9957810 A2		11-11-1999
			JP	2002509682 T		26-03-2002
US 5030855	A	09-07-1991	NONE			